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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/798,976	03/12/2004	Kenichi Taniguchi	L8612.04106	5350

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EXAMINER	
SINGH, RAMNANDAN P	
ART UNIT	**PAPER NUMBER**
2646	

DATE MAILED: 02/08/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/798,976	TANIGUCHI ET AL.	
	Examiner	Art Unit	
	Ramnandan Singh	2646	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *12 March 2004*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-26* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-26* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *12 March 2004* is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *Mar. 12, 2004*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Drawings

1. Figure 6 should be designated by a legend such as --Prior Art-- because only that which is old is illustrated. See MPEP § 608.02(g). Corrected drawings in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. The replacement sheet(s) should be labeled "Replacement Sheet" in the page header (as per 37 CFR 1.84(c)) so as not to obstruct any portion of the drawing figures. If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Specification

2. The abstract of the disclosure is objected to because it contains more than 150 words. Correction is required. See MPEP § 608.01(b).

Claim Objections

3. Claims 5, 7 and 8 are objected to because of the following informalities:

As to claim 5, line 5, "saidsecond" should be changed to –said second---;

As to claim 7, line 2, "saidnotch" should be changed to –said notch---;

As to claim 8, line 2, "saidnotch" should be changed to –said notch---.

Appropriate correction is required.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

5. Claims 1-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Troxel [US 6,865,270 B1] in view of Crochier et al [US 5,664,011].

Regarding claim 1, Troxel teaches an echo-canceling apparatus shown in Fig. 3, comprising a loudspeaker which outputs a received voice from a far-end speaker, a microphone to which the voice of a near-end speaker is input, and a CPU (i.e. LMS algorithm processor) which controls the whole system, wherein:

the CPU (67) comprises transfer function estimation means which

estimates the transfer function of the acoustic echo path between a loudspeaker and a microphone [Figs. 3, 6; col. 7, line 58 to col. 8, line 12; col. 4, lines 52-67],

first filter means (66) which operates using the transfer function estimated by the transfer function estimation means,

first subtraction means (68) which subtracts the output signal of the first filter means from the signal from the microphone,

second filter means (57) which operates using the transfer function copied from the first filter means (66) in case the estimation accuracy of the transfer function estimation means is high (i.e. more accurate or better) [Fig. 6; col. 10, lines 15-27; Figs. 7-8],

second subtraction means (58) which subtracts the output signal of the second filter means from the signal from the microphone [Figs. 3-4; col. 4, lines 52-67; col. 6, lines 6-42]

Troxel does not teach expressly a singing detector and employing a notch filter to filter out the singing frequency band.

Crochiere et al teach employing a singing detector (230) (i.e. spectral detector) to detect a singing signal (i.e. howling) which is a narrowband signal [col. 2, lines 15-34; and to notch a specific frequency band component (of the singing signal present) in the signal, x(k), received from a far-end speaker [Figs. 2-3; col. 7, line 26 to col. 8, line 6]. Since the spectral detector (230) detects when signal x(k) has a narrow frequency

distribution over a specified period of time [col. 7, lines 38-39], then it removes the detected signal [col. 7, lines 45-46] by operating an adaptive FIR notch-filter thereby maintaining spectral flatness for the echo canceller [col. 7, line 55 to col. 8, line 1]. Thus, switching means which selects between (i) the signal from the far-end speaker processed by the notch filter means and (ii) the signal from the far-end speaker not processed by the notch filter means, is inherent in the spectral detector 230 which performs two functions –(a) when singing signals are detected, then apply (i.e. switch on) the notch-filter to notch the narrowband frequency band of the singing signal, and (b) when singing signals are not detected, then do not apply (i.e. switch off) the notch filter.

At the time of the invention, it would have been obvious to a person of ordinary skill in the art to combine the teachings of Crochiere et al with Troxel in order to prevent updating the second filter (57) coefficients of Troxel in response to a singing signal (i.e. a narrowband signal) [Crochiere et al; col. 3, lines 26-30], and provide greater robustness to narrowband signals [Crochiere et al; col. 8, lines 44-45].

Claim 9 is essentially similar to claim 1 except for copying the transfer function. Troxel further teaches a copy step of copying the transfer function used in the first filter (66) step in case the estimation accuracy of the transfer function estimation step is high [Figs. 3, 6, 8; col. 6, lines 15-29; col. 10, lines 16-27; col. 7, line 60 to col. 8, line 24].

Claim 15 is essentially similar to claim 9 except for the fact that it claims a program to execute the method. Troxel further teaches flow charts (i.e. programs) shown in Figs. 4, 7, 8, for executing the method using a processor (67) [Figs. 3-8; col. 4, line 52 to col. 5, line 35].

Regarding claim 2, Troxel teaches the echo-canceling apparatus, wherein: the first subtraction means (68) outputs the subtraction result to the transfer function estimation means (67) (i.e. LMS); and the second subtraction means (58) output the subtraction result to the far-end speaker [Fig. 3].

Claims 10 and 16 are essentially similar to claim 2 and are rejected for the reasons stated above.

Regarding claim 3, Troxel teaches the echo-canceling apparatus, wherein: the first filter means (66) and the second filter means (57) perform convolutional operation of a signal $X_L(k)$ from the far-end speaker and a transfer function from the LMS (67), and outputs the result of the convolutional operation [Figs. 3, 6; col. 7, line 60 to col. 8, line 12].

Claims 11 and 17 are essentially similar to claim 3 and are rejected for the reasons stated above.

Regarding claim 4, Crochiere et al teach the echo-canceling apparatus, wherein: in case the singing detection means (230) has not detected singing, the second filter means operate using the transfer function copied from the first filter means (i.e. updating the second filter coefficients using the coefficients of the first filter) [col. 7, lines 47-55].

Claims 12 and 18 are essentially similar to claim 4 and are rejected for the reasons stated above.

Regarding claim 5, Crochiere et al teach the echo-canceling apparatus, wherein: in case the singing detection means (230) has detected singing, the singing detection means stops copying (i.e. updating) of the transfer function from the first filter means to the second filter means [col. 7, lines 41-46], and the notch filter means notches the component of the frequency band where singing has been made in a signal from the far-end speaker [col. 7, line 51 to col. 8, line 1].

Claims 13 and 19 are essentially similar to claim 5 and are rejected for the reasons stated above.

Regarding claim 6, Crochiere et al teach the echo-canceling apparatus, wherein: the singing detection means (230) , detecting a frequency band having a protruding section (i.e. a narrowband) in the frequency spectrum of a signal to be input,

determines that singing has been made in the frequency band having the protruding section [col. 7, lines 38-39].

Claims 14 and 20 are essentially similar to claim 6 and are rejected for the reasons stated above.

Regarding claim 7, Crochiere et al teach the echo-canceling apparatus, wherein: the notch filter means has a variable frequency band to be notched (i.e. adaptive FIR notch filter) [col. 7, lines 63-65].

Regarding claim 8, Crochiere et al teach the echo-canceling apparatus, wherein: the notch filter means (230) is controlled for the notched frequency band to match (i.e. to adapt) the frequency band detected by the singing detection means where singing is made [col. 7, lines 63-65].

6. Claims 21-26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Troxel [US 6,865,270 B1] in view of Crochier et al [US 5,664,011], and further in view of Bershad et al [US 20030219113 A1].

Regarding claim 21,Troxel teaches an echo-canceling apparatus shown in Fig. 3,

comprising a loudspeaker which outputs a received voice from a far-end speaker, a microphone to which the voice of a near-end speaker is input, and a CPU (i.e. LMS algorithm processor) which controls the whole system, wherein:

the CPU (67) comprises transfer function estimation means which estimates the transfer function of the acoustic echo path between a loudspeaker and a microphone,

first filter means (66) which operates using the transfer function estimated by the transfer function estimation means,

first subtraction means (68) which subtracts the output signal of the first filter means from the signal from the microphone,

second filter means (57) which operates using the transfer function copied from the first filter means in case the estimation accuracy of the transfer function estimation means is high (i.e. more accurate or better) [Fig. 6; col. 10, lines 15-27; Figs. 7-8],

second subtraction means (58) which subtracts the output signal of the second filter means from the signal from the microphone [Figs. 3-4; col. 4, lines 52-67; col. 6, lines 6-42]

Troxel does not teach expressly a singing detector and employing a notch filter to filter out the singing frequency band.

Crochiere et al teach employing a singing detector (230) (i.e. spectral detector) to

detect a singing signal (i.e. howling) which is a narrowband signal [col. 2, lines 15-34; and to notch a specific frequency band component (of the singing signal present) in the signal, x(k), received from a far-end speaker [Figs. 2-3; col. 7, line 26 to col. 8, line 6]. Since the spectral detector (230) detects when signal x(k) has a narrow frequency distribution over a specified period of time [col. 7, lines 38-39], then it removes the detected signal [col. 7, lines 45-46] by operating an adaptive FIR notch-filter thereby maintaining spectral flatness for the echo canceller [col. 7, line 55 to col. 8, line 1]. Thus, switching means which selects between (i) the signal from the far-end speaker processed by the notch filter means and (ii) the signal from the far-end speaker not processed by the notch filter means, is inherent in the spectral detector 230 which performs two functions –(a) when singing signals are detected, then apply (i.e. switch on) the notch-filter to notch the narrowband frequency band of the singing signal, and (b) when singing signals are not detected, then do not apply (i.e. switch off) the notch filter.

At the time of the invention, it would have been obvious to a person of ordinary skill in the art to combine the teachings of Crochiere et al with Troxel in order to prevent updating the second filter (57) coefficients of Troxel in response to a singing signal (i.e. a narrowband signal) [Crochiere et al; col. 3, lines 26-30], and provide greater robustness to narrowband signals [Crochiere et al; col. 8, lines 44-45].

Further, although Troxel teaches implementing the method using flow charts [Figs. 4, 7 and 8] on a digital signal processor [col. 4, line 52 to col. 5, line 35]; he does not teach expressly employing a machine-readable medium such as a magnetic, optical, or semiconductor storage medium. However, this is well-known in the art.

Bershad et al teach employing a computer-readable recording medium on which is recorded a program for the echo-canceling apparatus wherein the computer-readable medium may comprise a magnetic, optical, or semiconductor storage medium to store the program [Figs. 1-2; Para: 56; claims 21-24].

At the time of the invention, it would have been obvious to a person of ordinary skill in the art to combine the teachings of Bershad et al with the combination of Troxel Croshiere in order to automate the process.

Regarding claim 22, Troxel teaches the echo-canceling apparatus, wherein: the first subtraction means (68) outputs the subtraction result to the transfer function estimation means (67) (i.e. LMS); and the second subtraction means (58) output the subtraction result to the far-end speaker [Fig. 3].

Regarding claim 23, Troxel teaches the echo-canceling apparatus, wherein: the first filter means (66) and the second filter means (57) perform convolutional operation of a signal $X_L(k)$ from the far-end speaker and a transfer function from the LMS (67),

and outputs the result of the convolutional operation [Figs. 3, 6; col. 7, line 60 to col. 8, line 12].

Regarding claim 24, Crochiere et al teach the echo-canceling apparatus, wherein: in case the singing detection means (230) has not detected singing, the second filter means operate using the transfer function copied from the first filter means (i.e. updating the second filter coefficients using the coefficients of the first filter) [col. 7, lines 47-55].

Regarding claim 25, Crochiere et al teach the echo-canceling apparatus, wherein: in case the singing detection means (230) has detected singing, the singing detection means stops copying (i.e. updating) of the transfer function from the first filter means to the second filter means [col. 7, lines 41-46], and the notch filter means notches the component of the frequency band where singing has been made in a signal from the far-end speaker [col. 7, line 51 to col. 8, line 1].

Regarding claim 26, Crochiere et al teach the echo-canceling apparatus, wherein: the singing detection means (230) , detecting a frequency band having a protruding section (i.e. a narrowband) in the frequency spectrum of a signal to be input, determines that singing has been made in the frequency band having the protruding section [col. 7, lines 38-39].

Conclusion

7. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

(i) Ammicht et al teach a singing detector to detect singing [Figs. 5, 9; col. 11, lines 29-46; col. 10, lines 22-27];

(ii) Betts et al [US 5,828,657] teach applying a notch filter (615) using a switch (640) [Fig. 6; col. 2, lines 13-24; col. 6, lines 30-47]; and

(iii) Carter et al [US 20020164013 A1] teach singing in the telephone audio [Para: 0070] and utilizing notch filters to block a narrow segment of frequency [Para: 0073; 0077; 0081].

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ramnandan Singh whose telephone number is (571) 272-7529. The examiner can normally be reached on M-TH (8:00-5:30).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Sinh Tran can be reached on (571) 272-7564. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Ramnandan Singh
Examiner
Art Unit 2646